

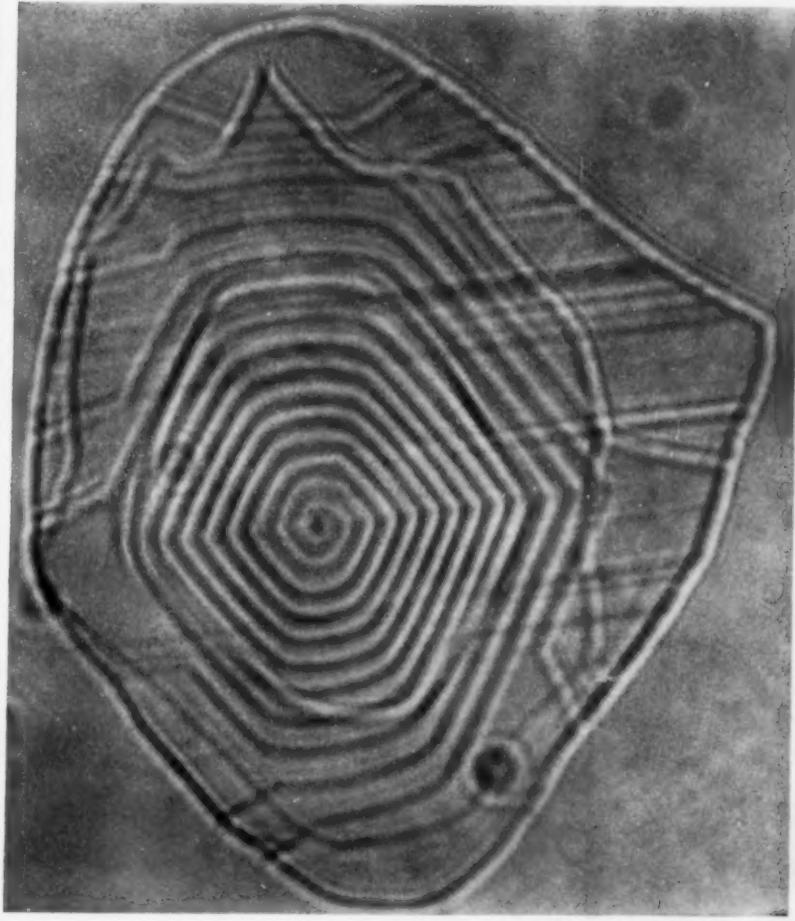
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE•



DECEMBER 12, 1936

Rare Crystal Form

See Page 371

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

Vol. XXX



The Weekly Summary of

No. 818

Current Science

Published Every Saturday by

SCIENCE SERVICE
2101 Constitution Avenue
Washington, D. C.

THE INSTITUTION FOR THE POPULARIZATION OF SCIENCE organized 1921 as a non-profit corporation, with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the journalistic profession.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Canadian subscribers please add 50 cents a year, foreign subscribers 75 cents a year to regular subscription rate to cover postage.

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Cable address: Sciserve, Washington.

Entered as second class matter at the post-office at Washington, D. C., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices.

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DO YOU KNOW?

A new kind of paint is intended to coat rusty surfaces, converting the rust into part of the pigment itself.

Wood contains two per cent vanillin, and a Canadian company will extract this flavoring substance by a new process.

As a preservative measure, air-conditioning has been installed in the U. S. Frigate *Constitution*, known to most of us as "Old Ironsides."

From studies of the U. S. Weather Bureau it has been found that atmospheric conditions producing fog may produce mirage as well.

Twenty-five Indian tribes are represented on the nine Government projects to improve economic conditions on the Shoshone Reservation, in Wyoming.

China's ancient crop, the soy bean, has gained such swift importance in the United States that it outranks corn in the grain market transactions on some busy days.

A big sea devil recently caught off the coast of California was 12 feet across and weighed 800 pounds.

One bite of the deadly amanita toadstool has been known to cause death in a child who picked and tasted the plant.

A British beekeeper believes he has found a way to get honeybees to make their combs inside half-pound bottles and fill them with honey.

Railroads are interested in a new type of box car made of alloy steel and weighing about 8,000 pounds less than the present standard car.

A safety device for airplanes is an alarm that goes off when the carbon monoxide concentration from the engine goes beyond 0.02 per cent.

A new rust-proof steel reported from Germany is said to resist acids that ordinarily occur in foods, and therefore is useful in manufacture of knives and forks, casseroles, trays, and similar articles.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

ARCHAEOLOGY

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ASTRONOMY

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BIOCHEMISTRY

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BIOLOGY

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CHEMISTRY

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ENGINEERING

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MEDICINE

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PUBLIC HEALTH

Should a workman use his handkerchief in removing dirt from another's eye? p. 377.

RADIO

Does use of radio ever imperil lives? p. 375.

TECHNOLOGY

What happens when coal is heated for coking? p. 373.

PLANT PHYSIOLOGY

Seedless Fruits Formed in Unpollinated Flowers

Salve Containing Growth-Promoting Chemicals Rubbed On Cut Surface of Ovary Induced Fruiting in Plants

SEEDLESS tomatoes and peppers have been induced to form in unpollinated flowers by treating the fruit-producing parts, or ovaries, with any one of four different organic acids, Dr. Felix G. Gustafson of the University of Michigan has reported to the National Academy of Sciences through that body's official *Proceedings*. (November.) Similar results were also obtained with the fruits and seedpods of other vegetables and garden flowers.

While no immediate commercial application is contemplated, it is interesting to note that in the tomatoes at least the seedless specimens had very small locules or seed-spaces—indeed in some of the smaller ones the flesh was completely solid. Immediate commercial exploitation is regarded as impracticable at present because each flower requires individual operation by a skilled botanist. The real significance of the experiments is proof that fruit production without pollination is possible by use of growth-promoting substances.

Growth-Promoting Chemicals

The chemicals used by Dr. Gustafson were indole-propionic acid, indolebutyric acid, indole-acetic acid, and phenylacetic acid. All of these have been used by a number of botanical researchers to promote the growth of stems, leaves, etc., on dormant plants and parts of plants. One, indole-acetic acid, has been found in extracts of plants and has been called heteroauxin because it acts in promoting growth like auxin, the natural growth-promoting substance.

The four acids were mixed into a kind of salve with hydrous lanolin for application to the places where growth promotion was desired. In this, Dr. Gustafson followed the technique developed at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., by Drs. P. W. Zimmerman and A. E. Hitchcock, which won for its originators the \$1,000 annual prize of the American Association for the Advancement of Science a year ago.

In the experiments, the stigma or

natural pollen-receiving surface was cut off and the growth-promoting acid preparation smeared on the cut surface. From there it diffused into the unpollinated ovary and caused the development of all parts except the fertile seeds themselves. In some of the species used, seeds did develop, but when they were cut open they were found to be hollow, without the tiny embryo plant necessary for germination. In other cases, as in the seedless tomatoes, the fruits grew and ripened normally and did not contain even hollow seeds. In still other cases, relatively little fruit developed.

In all the experiments, parallel controls were carried through. This was done in two ways: by pollinating companion flowers to the ones under treatment, and by keeping others both untreated and unpollinated. The pollinated flowers developed fruits or pods with seeds, as was expected, while the unpollinated ones died and dropped off.

Dr. Gustafson sums up the results of his numerous experiments in two sentences: "The significance of these experiments seems to be that definite substances, which are not specific, cause the ovary of a flower to develop into the fruit. These substances seem to be closely related to the auxins."

Science News Letter, December 12, 1936

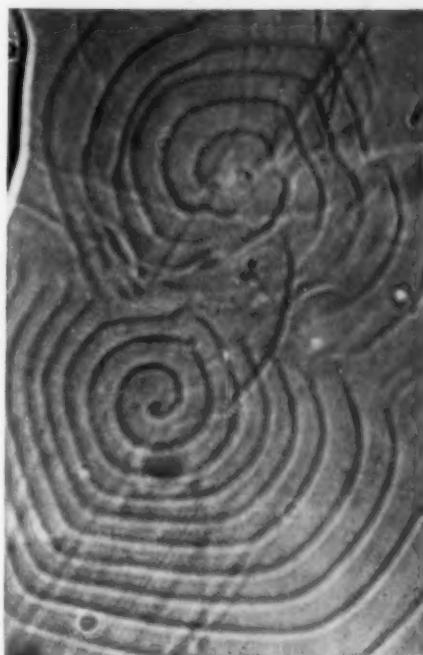
PHYSICS

Spiral Organization Now Found in Paraffin Crystals

See Front Cover

SPIRAL ORGANIZATION, so common in plant and animal life and almost universal in nebulae, is a very rare phenomenon in inanimate molecular structures. Preserved in Princeton's museum is a corborundum crystal that has on it a spot the size of a pin head, which when magnified, shows a simple but perfect spiral. Also, in rare cases the face of a quartz crystal properly etched will show a type of spiral.

Spirals in abundance and of rare beauty have recently been discovered by Prof. C. M. Heck of North Carolina State College, and that too in common



UNUSUAL

Crystals seldom have a structure in spiral form if they are of inanimate substance. These paraffin crystals are an exception. Notice the clockwise and counter-clockwise direction.

paraffin. Shown on the cover of this week's SCIENCE NEWS LETTER is one of these spiral crystals as it grew from a solution of paraffin in mineral oil. It is magnified 1,200 diameters and shows each convolution repeating with exactness the exterior outlines of the crystal, a significant element of the discovery.

Professor Heck discovered these crystals while researching on the equilibrium conditions shown between solid and liquid compounds of the paraffin chemical series. His findings are proving of much interest to the refiners of oils and gasolines as they show paraffin crystals to be sensitive detectors of foreign materials when in these products. The crystals vary their shape and internal structure markedly. For example, these spirals are found to double and become twin spirals in certain cases, one spiral turning clockwise and the other counter-clockwise in most cases.

No explanation of the spiral formation is given by Professor Heck though he finds strong indications that all tabular paraffin crystals have a spiral structure which becomes visible only in exaggerated cases. Analysis with polarized light so far has not shown any difference between crystals with visible spirals and those without them.

Science News Letter, December 12, 1936

BIOLOGY

Science Raises Hybrid Fish Whose Young Are All Males

CONTROL of sex determination in animals, long an absorbing problem to biologists, promises to be less of a mystery following recent experiments in fish breeding by Dr. A. W. Bellamy, zoologist on the Los Angeles campus of the University of California. Two small species of subtropical fish, known as *Platypoecilus maculatus* and *variatus*, respectively, have yielded through hybridization the unusual results recently reported by Dr. Bellamy.

The *maculatus* fish, a chunky little creature about two inches long, carries its sex-determining factor in the female. On the contrary, as in many common animals, the *variatus* appears to control sex through the male. Dr. Bellamy crossed these two species of fish, and fortunately obtained fertile hybrids. Such hybrids, crossed by a certain scheme with one of the original species, produced nothing but males.

Taken as separate phenomena, such occurrences as sex determination by the female, and one-sexed progeny, are not new to the zoological world, though uncommon. Their combination in a se-

ries of fertile hybrids is novel, however, and useful to biologists in search of the rules governing sex. A most promising research program has been opened, in which not only the all-male progeny will be studied, but also other progeny which are of unbalanced sex ratio; also certain unfortunate finny offspring in which both male and female characters have been combined in one creature. The fact that a life generation of these fish spans but a few months enables more prompt answers to genetic questions than in the case of many larger animals.

Unfortunately the present state of scientific sex control is still far from application to animal husbandry. Such laudable schemes as the raising of White Leghorn hens only, sans the excess skinny roosters of this breed, receive no encouragement from Dr. Bellamy. Certainly no progress in economic application can be expected until a more thorough understanding is reached as to the microscopic structures, or bodily activities, which control the apparent accident of sex.

Science News Letter, December 12, 1936

MEDICINE

Patent on Safer Morphine Given to U.S. Government

ONE WEEK after the destruction by the U. S. Bureau of Engraving of \$15,000,000 worth of the narcotic drug, heroin, the Secretary of the Treasury accepted the patent rights to another narcotic drug.

This is the new, safer morphine prepared by Dr. Lyndon F. Small of the University of Virginia. Dr. Small formally presented his patent rights on this new morphine to Secretary Morgenthau on December 1.

Both these seemingly contradictory actions were taken as part of the government's fight to control the evil of narcotic drug addiction.

The destruction of the heroin was in conformity with regulations of the International Narcotics Convention.

Heroin, a morphine compound, is considered the most vicious of habit-forming drugs. The new morphine prepared by Dr. Small will, it is hoped, prove to be without addiction, or habit-forming, properties.

The goal of a non-habit-forming morphine is being sought in a fundamental attack on narcotic drug addiction launched in 1929 by the National Research Council, the U. S. Public Health Service and the U. S. Bureau of Narcotics. The research on morphine substitutes is being carried on at the Universities of Virginia and Michigan.

A morphine compound which it was hoped would be without addiction properties was prepared and patented by Dr. Small two years ago. The patent rights

on this were also turned over to the Secretary of the Treasury by Dr. Small.

When clinical trials showed that the compound was more habit-forming than ordinary morphine, the Surgeon General of the U. S. Public Health Service recommended to the Secretary of the Treasury that the United States Government prohibit the importation, manufacture, sale or distribution of this drug in the United States.

The latest morphine prepared and patented by Dr. Small is less poisonous, more powerful in relieving pain and acts longer than ordinary morphine. Whether it will be equally, more, or less habit-forming than ordinary morphine cannot yet be told. Clinical trials to determine this point are now under way but have not been concluded.

Science News Letter, December 12, 1936

METEOROLOGY

Radio Balloon Checks Weather at Great Height

RISING over 30,000 feet higher into the air than the regular weather observing airplane, a robot weather balloon has ascended high above the earth in the first night-time radio meteorograph balloon ascension in this country. This pioneering flight was conducted at five a.m. on November 30 immediately following the regular weather flight by airplane.

Dr. Charles F. Brooks, director of the Blue Hill Observatory of Harvard, found the minimum temperature of 77 degrees below zero Fahrenheit when the balloon reached its peak altitude of 50,000 feet, one hour and 12 minutes after its release from the earth.

While the radio speaking weather balloon shot up through the lower part of the atmosphere it showed the same form of temperature curve as that brought back by the weather-observing airplane. There was a 13-degree fall to 3,500 feet, then a sharp 2-degree rise, followed by 23-degree fall when 17,000 feet was reached.

The instrument was designed by Dr. K. O. Lange and A. E. Bent, research associates at Harvard and built by R. D. Feiber. Dr. Lange and Mr. Feiber released the three balloons and instrument, and C. B. Pear, Jr., received the radio signals, which were recorded by two chronographs.

The results, including a humidity record, will be reported to the International Commission for the Investigation of the Free Atmosphere.

Science News Letter, December 12, 1936

PHYSIOLOGY

Must Rush Life-Saving Shocks To Save the Electrocuted

Electric Counter-Shocks Within Four Minutes Revive Dead Animals Without Surgery; Stop Heart Fibrillation

IN CASES of accidental electrocution, life-saving electric counter-shocks must be administered within four minutes. Otherwise all hope of reviving the dead must be abandoned.

Research by Prof. William T. McNiff and Dr. Leonard J. Piccoli of Fordham University has demonstrated this urgent need for heroic treatment of electrical workers or others who suffer killing shocks. But they warned:

"The method of counter-shock would be absolutely ineffectual in reviving any victim of electric shock resulting from legal electrocution."

Their studies showed that damage to animals from electric shock was most severe when one electrode of the shocking apparatus was attached to the skull and the other to the tail. In legal electrocution one electrode is attached to the base of the brain and the other to the calf of the leg. The result, as in the head-to-tail arrangement on animals,

is that a strong current causes death by paralysis and destruction of the brain. Furthermore, the body temperature becomes so high in any case of legal electrocution, more than 140 degrees Fahrenheit, that the reestablishment of the blood circulation is impossible.

Like other investigators in this field, Prof. McNiff and Dr. Piccoli find that electric shock kills its victims by throwing the heart into what doctors call fibrillation. This is a condition in which each fiber of the heart muscle contracts individually. The effect is a useless twitching, instead of a strong contraction that will force the blood out into the body.

Counter-shock with a 60-cycle alternating current applied for a very short time stops this fibrillating and revives the animals. The method has been applied in cases of fibrillation during operation when the heart is already ex-

posed and electrodes can be applied directly. But the Fordham investigators point out that by their method of applying one electrode to the back and another to the chest, both near the heart area, it is possible to revive animals without surgery and should be possible in the same way to revive victims of accidental electric shock.

This method should, they feel, be particularly valuable in accidental electric shocks encountered in electrical industries, because in these accidents the victim is generally shocked not through the head but through the arm or body.

Following revival by counter-shock, the patient should be kept in a room the temperature of which is at least 60 degrees Fahrenheit. Animals revived but kept at lower temperatures did not survive.

The Fordham investigators also found that following electric shock animals were ready prey to tuberculosis. They died in from one-sixth to one-third the normal time when tuberculosis germs were injected following revival from previous electric shock.

Science News Letter, December 12, 1936

TECHNOLOGY

Better Coking of Coal Results from Researches

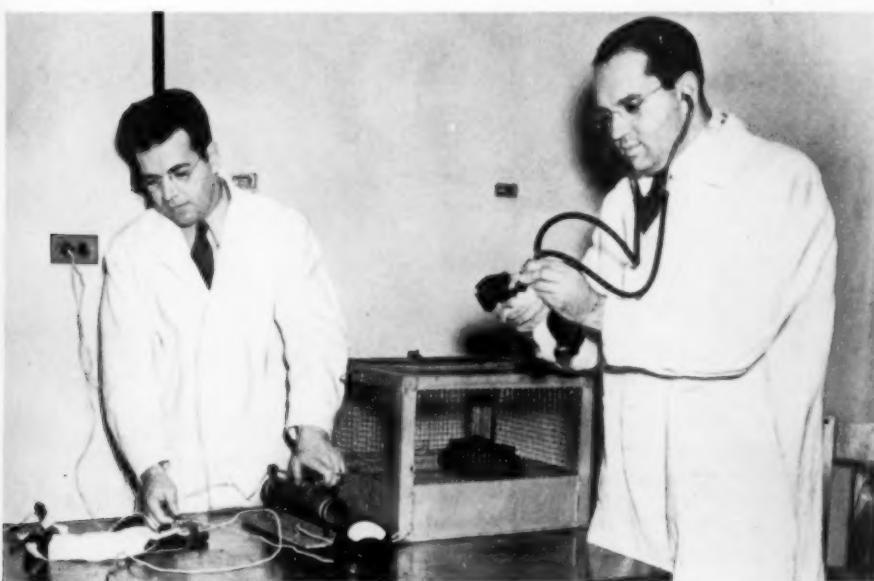
CHEAPER, better and more versatile coking of coal is in prospect as the result of five years of fundamental research at the Coal Research Laboratory of the Carnegie Institute of Technology.

By breaking with traditional methods of turning bituminous coal into coke, gas, tar and chemicals, William B. Warren explained to leading industrialists, it should be possible for coke oven operators to decrease cost, cut operating time by a third, while improving quality and yield of coke.

Mr. Warren recommended that coal be preconditioned before coking by warming it to 200-400 degrees Centigrade (400-750 degrees Fahrenheit). This precarbonization treatment could be carried out in low temperature apparatus that is much less expensive than the coke ovens themselves.

Delving into just what happens when coal is heated and carbonized, Mr. Warren evolved a theory. This theory, applied to practical operation of coke ovens, promises the large economies.

First, when coal is heated the large molecules break apart into much smaller units. At slightly higher temperatures, surface changes take place within



GIVING LIFE

Prof. William T. McNiff, left, is about to restore life to a guinea pig dead from electric shock as Dr. Leonard J. Piccoli listens with a stethoscope to the heart of an animal already so restored.

the coal that cause the little units to recombine into larger ones once more. This takes place slowly and this temperature must be held for a time. Then as the temperature is raised real thermal decomposition takes place. The surfaces of the molecules are attacked and portions torn off, appearing as tar and gas.

By manipulating the process so that the molecules have large surfaces, which means the molecules are small in size, more tar is produced at the expense of coke. Or if tar is not desired, the high temperatures can be used when the molecules are large.

There is hope that the new knowledge of coking will allow the making of coke from coals which are not at present considered "coking coals."

One-sixth of all the coal produced

in the United States is coked and the new methods promised by the Carnegie Institute's researches are for that reason of great economic importance. From coal, in addition to coke and gas, come ammonia and a vast array of drugs, perfumes, chemicals and dyes made from the coal tar.

The Carnegie Institute of Technology's coal research laboratory began operation in 1930 as the result of the international coal conferences organized by Dr. Thomas S. Baker, now president emeritus. Need for fundamental research on coal revealed at these conferences caused Dr. Baker to project and materialize the laboratory, which is the only one of its kind in America. The Buhl Foundation and commercial firms using and producing coal have supported the laboratory.

Science News Letter, December 12, 1936

BIOCHEMISTRY

Quick Chemical Test for Antineuritic Vitamin B.

TESTS for the antineuritic vitamin B in foods and food preparations may be very much speeded up as the result of a new method discovered by Drs. E. V. McCollum and H. J. Prebluda of the Johns Hopkins School of Hygiene and Public Health. If successful, this test will be the first chemical test for this vitamin (*Science*, Nov. 27).

A purple red color shows the presence of vitamin B (known to scientists as vitamin B₁) when certain aniline derivatives are added to the vitamin or to foods containing it, the scientists report.

The aniline derivatives are p-amino acetanilid or methyl-p-amino phenyl ketone. Either of these after treatment with nitrous acid produces the characteristic purple red compound when added to vitamin B under certain conditions. The compound is stable and highly insoluble in water. It shows not only the presence of vitamin B but also the amount of the vitamin in the food or food compound. This compound may also give a relatively simple method of obtaining the vitamin in concentrated form. Crystals of the pure vitamin can now be obtained, but by a tedious and expensive method.

Chief advantage of the new test for the vitamin is its speed. Heretofore when scientists wanted to determine whether vitamin B was present in a

food or food compound, they had to study the effect of the food when fed to animals that were not getting vitamin B from any other source. This took much time. Yet it was from these animal studies that scientists learned that yeast and whole grains are good sources of the vitamin, and that it is also present in lesser amounts in other foods.

Science News Letter, December 12, 1936

CHEMISTRY

Four Types of Plastics Now in Familiar Use

A FEW years ago metal, wood, ceramics, rubber, concrete and stone comprised the list of common materials in everyday use. Chemistry has added another class of widely used materials: plastics.

Every day nearly every American handles or uses an organic plastic of some sort. An electric switch, a button on your clothes, an automobile part, jewelry, or a knife handle; these and a thousand other things about you are made of materials that have come out of the laboratory in a relatively few years. Some of the trade names used for plastics are now common words: Bakelite, Celluloid, Beetlesware, Cellophane.

Gordon M. Kline in the National

Bureau of Standards circular 411 (obtainable from Government Printing Office, Washington, D. C., 5 cents) describes four principal types of organic plastics.

Synthetic Resins

1. Synthetic resins have been produced having the hardness of stone, the transparency of glass, the flexibility of rubber, or the insulating ability of mica. In combination with suitable fillers, they are readily molded into products characterized by excellent strength, light weight, dimensional stability, and resistance to moisture, moderate heat, sunlight, and other deteriorating factors. Some of the cheap raw materials used in their production include phenol, urea, formaldehyde, glycerol, phthalic anhydride, acetylene, and petroleum.

2. Natural resins are more familiarly known by their common names, such as shellac, rosin, asphalt, and pitch, than by proprietary names attached by manufacturers to molding compositions prepared from them. They are used in industry for the production of the fusible type of molded product as distinguished from the infusible articles formed by some of the synthetic resins.

3. The cellulose derivatives are probably the most widely used and best known of any of these materials. To this group belong Celluloid and other cellulose nitrate plastics; cellulose acetate commonly used in the Celanese type of rayon and as a substitute for the slightly less expensive nitrated product when nonflammability is desired; and regenerated cellulose familiar as Cellophane and the common or viscose type of rayon. The basic raw material, cellulose, is obtainable in fairly pure, fibrous condition as either ordinary cotton or pulped wood. Treatment with suitable chemicals converts cellulose into compounds which are characterized by the ease with which they can be formed into desired shapes.

From Milk and Beans

4. The protein plastics are perhaps best known according to the source of the raw material, for example, casein from skimmed milk and soybean meal from soy beans. These protein substances are thoroughly kneaded into a colloidal mass, which is then formed into sheets, rods, or tubes by suitable presses or extrusion devices. The formed pieces are hardened by treatment with formaldehyde. The finished products are machined from blanks cut from the hardened material.

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MEDICINE

Life-Saver for "Bleeders" Found—in Egg White

Mixed With Potassium Bromide and Kept at Body Heat Simple Substance Yields Material To Make Blood Clot

THIS CURSE of the Hapsburgs has been foiled—by egg white.

The threat of death is now lifted from the heads of royalty and commoners alike who suffer under this curse, the dangerous, hereditary disease of hemophilia. These men and boys (the disease is transmitted by women but afflicts only males) need no longer lead a timid, hot-house existence for fear a scratch or slight exertion will bring on fatal bleeding.

The remedy, which could have saved the lives of kings and princes of the past, has been discovered by three University of Sheffield medical scientists, Drs. W. A. Timperley, A. E. Naish, and G. A. Clark.

Egg white thoroughly mixed with potassium bromide and kept in an incubator at body temperature for several days yields a substance which makes blood clot quickly and firmly, they report to the *Lancet*, medical journal published in London. Failure of the blood to clot at the normal rate of speed is the dangerous characteristic of hemophilia.

The new remedy cannot be called a cure, these doctors state. The cases they report, however, show it to be a promising treatment.

One of their patients was a 15-year-old boy who suffered from hemophilia

all his life. Any thoughtless lifting by him caused a painful deep swelling in the muscles of the trunk, due to internal bleeding. Walking on uneven ground brought on attacks of bleeding into the joints. He had to use crutches for years. His "baby teeth" could not be pulled for fear of fatal hemorrhage, and these were preventing the successful development of the permanent teeth.

Two hours after the first injection of the egg white preparation his blood clotted in one-half the time it took before the injection. After a number of injections he was able to walk without crutches, run about on uneven ground, and jump off chairs without any signs of hemorrhage into joints or muscles. After further injections, he was able to have the baby teeth pulled safely.

Twelve other patients have been treated with the new remedy, and all seem to have been helped. Men who could not do any work, because the least exertion caused bleeding into joints or muscles, were able to wield four-pound hammers and hold down jobs as cobblers. Others were able to have badly decayed teeth pulled in complete safety. All of them were able to lead nearly normal lives, without danger or worry over the threat of fatal bleeding.

The treatment, apparently, must be kept up and the amount of the remedy

given depends on the patient's condition. In hemophilia, the patients have "good" and "bad" periods. During the "bad" periods the slightest cut or exertion will cause dangerous bleeding. At such times they need more of the remedy. During good periods, they can get along with little or none.

Most striking effect on the clotting of the blood was observed in the case of a man whose blood clotted so slowly that it was never possible to get any measure of the clotting time. A sample of his blood was examined for 72 hours, but no signs of clotting were seen. He had the longest clotting time of any patient the Sheffield doctors had any record of. The day after the first injection of the egg white preparation, this man's blood clotted in ten minutes.

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RADIO

Medical Use of Radio Endangers Other Lives

PHYSICIANS whose business is saving lives may be unwittingly endangering other lives through the use of therapeutic equipment that interferes with radio communication.

Radio messages (*Turn to page 380*)

SAVES SOIL AND WATER

This new maze-like pattern for the landscape is not intended to hide a cherished princess from the gaze of the curious. Instead it holds the life-giving water for the crops from running off. The standing crop is wheat; the soil between has been planted to cotton. Broad-topped terraces that run around the hills hold the water and prevent sheet erosion and gullying. The photograph was taken in South Carolina by Orin S. Welch, staff photographer of the U. S. Soil Conservation Service.



MEDICINE

New Rabies Vaccine Is Safer Means of Protection

A NEW and safer weapon against rabies has been developed by Drs. Leslie T. Webster and Anna D. Clow of the Rockefeller Institute for Medical Research, it appears from their report to the journal, *Science* (Nov. 27).

The new weapon is a rabies vaccine made from rabies virus cultivated in the laboratory. It protects mice against rabies "street" virus and promises to give the same protection to dogs from the rabies virus which they may pick up from other rabies-infected animals on the streets or elsewhere.

Rabies vaccines now in use are composed largely of animal brain or spinal cord tissue containing virus in either virulent or inactive form. The presence of nervous tissue in the vaccine, the Rockefeller scientists point out in their report, is not only unnecessary but potentially dangerous. It may produce paralysis or other unfortunate results following vaccination. The new virus does not contain nervous tissue.

Science News Letter, December 12, 1936

PSYCHOLOGY

Newspaper Readers Want To Read General News

MOST people read the newspapers for news, not for the serial stories, a scientific survey shows.

General news is the most interesting feature in a newspaper to both men and women adult readers. The average university student ranks sports just a bit higher in reader appeal. Journalism students, however, who take their profession seriously, give first place to general news. Neither journalism nor other university students find either editorials or the financial pages as interesting as the adult does. Art, music and the woman's page fail to appeal much to any of the three groups.

These are some of the findings reported by J. R. Gerberich, U. S. Office of Education, and Prof. J. A. Thalheimer, University of Kansas (*Journal of Applied Psychology*, August). They secured preferences for different types of newspaper content from 515 individuals of whom 225 were university students, 165 were adult citizens and 125 were student journalists.

Travel and human interest are the two highest ranking types of stories in general news. In descending order come

self-improvement, sports, politics, photographs, war and education. Items most avoided were architecture, engineering, finance, art, animals, law and medicine. Biography, which is heavily represented on book publishers' lists, ranks very low in interest to newspaper readers. Serial stories rank lowest of all.

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MEDICINE

New Rabies Vaccine Is Safer Means of Protection

A NEW and safer weapon against rabies has been developed by Drs. Leslie T. Webster and Anna D. Clow of the Rockefeller Institute for Medical Research, it appears from their report to the journal, *Science* (Nov. 27).

The new weapon is a rabies vaccine made from rabies virus cultivated in the laboratory. It protects mice against rabies "street" virus and promises to give the same protection to dogs from the rabies virus which they may pick up from other rabies-infected animals on the streets or elsewhere.

Rabies vaccines now in use are composed largely of animal brain or spinal cord tissue containing virus in either virulent or inactive form. The presence of nervous tissue in the vaccine, the Rockefeller scientists point out in their report, is not only unnecessary but potentially dangerous. It may produce paralysis or other unfortunate results following vaccination. The new virus does not contain nervous tissue.

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PSYCHOLOGY

Newspaper Readers Want To Read General News

MOST people read the newspapers for news, not for the serial stories, a scientific survey shows.

General news is the most interesting feature in a newspaper to both men and women adult readers. The average university student ranks sports just a bit higher in reader appeal. Journalism students, however, who take their profession seriously, give first place to general news. Neither journalism nor other university students find either editorials or the financial pages as interesting as the adult does. Art, music and the woman's page fail to appeal much to any of the three groups.

These are some of the findings reported by J. R. Gerberich, U. S. Office of Education, and Prof. J. A. Thalheimer, University of Kansas (*Journal of Applied Psychology*, August). They secured preferences for different types of newspaper content from 515 individuals of whom 225 were university students, 165 were adult citizens and 125 were student journalists.

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ENGINEERING

Roads Are Not all Asphalt

Tin Cans, Old Bottles, Iron, Salt, Molasses, and Even Diamonds and Jade Used in Modern Pavements

MOTORISTS who think of highways in terms of asphalt and concrete may be skeptical about driving on a road of cast iron, molasses, or old bottles. But the fact is that these and a fantastic variety of other materials are being tried in the construction of highways.

To the Russian town of Sverdlovsk should probably go the distinction of sponsoring the most ornamental highway pavement. Here a road was found containing crushed jade, topaz, green malachite and jasper. The Russian road was a costly mistake, but not so costly as the one at Kimberly, South Africa. First prize for extravagance is awarded that most expensive macadam road on record—a blue clay "studded" with diamonds, some as big as hazelnuts and worth, altogether, about five million dollars.

Quite conscious, on the other hand, has been the liberality of road builders in England, where thirty years ago a part of Buckingham Palace Road was surfaced with camphor wood, one of the most rare and beautiful types imported from the East Indies. In Piccadilly an eccentric highway enthusiast worked for many years on a pavement of boxwood, but before his luxury had been completed it had taken all his money.

Old Bottles

English experiment has revealed that glass roads made of old bottles and other glassware remelted and molded in blocks eight inches square will produce a surface strong enough to stand up under the heaviest traffic, even though the thickness of the glass is but an inch and a half. To prevent skidding, the surface of the blocks is serrated in a diamond pattern, and firm seating in the bituminous base course is attained by hollowing the under sides about an eighth of an inch. The use of bitumen between blocks is intended to minimize the impact from passing motor vehicles. In Czechoslovakia glass is powdered and mixed with cement for highway surfacing.

From Scotland, Italy and Australia

come reports of rubber roads, some of which are made with tiles only eight-tenths of an inch thick, laid in a thin asphalt cushion on a stone base. Although some of these roads have proved too costly, it is hoped that the use of more latex with the rubber will result in greater economy and consequent extension of these pavements.

Cast iron roads have been used in London for some time, and results thus far indicate that these should have a practically "everlasting" service life. The iron is in the form of ribbed and perforated tiles a foot square, which interlock and are laid in a bituminous mixture applied hot and "squeegeed" over a concrete base. The joints are then grouted with the same material.

Iron Roads

Iron highways are said to be economical for heavily travelled routes, and are easily kept clean. Steel mesh roads, another of the metal types, are reported to have particular advantages for severe

traffic conditions, the mesh for these surfaces being assembled on an under-cushion of mastic asphalt, then filled to the top with the same material.

The salt roads belong to the class of so-called stabilized soil types. Benefit to the wearing-course is obtained by action of the salt on the soil particles, causing crystallization in the surface, moisture retention, and the shedding of excess water. Rock salt is the form most commonly used, although evaporated salt, as well as salt brine, give equally good results.

Molasses

The driver who has been stuck in the mud may find little comfort in the thought of a highway stabilized with molasses. Nevertheless, a molasses road fifty miles long is now in use in India, and owing to the proximity of sugar factories where large accumulations of waste molasses may be obtained, this material is especially cheap for road purposes.

Mixed with water, the molasses is spread out over the surface, which has been swept of all loose dust by means of coconut fiber brooms. After the



EXPERIMENTAL ROAD

At the Arlington, Va., experiment farm scientists of the U. S. Bureau of Public Roads have the full-size pavement shown above where all manner of different types of highway material can be put through rigid tests.



USING THE DIVINING ROD

U. S. Bureau of Public Roads engineers use the latest methods of geophysical prospecting to locate the depth of bed rock beneath road foundations and to find deposits of gravel and stone which might be useful in highway building.

molasses has soaked into the road a half hour, it is covered with coarse sand, and traffic allowed to pass over it. To prevent the molasses from being washed away by rain, the addition of burnt lime is now being experimented with in order to produce tri-calcium sucrate, which is insoluble in water. The use of a small quantity of charcoal powder is expected to quicken the setting action.

After a few weeks of use, a molasses road becomes thoroughly compacted by traffic, and the surface looks dark, as if it had been tarred or asphalted.

Another binder for roads has recently been developed from the raw liquid waste product of rayon and cellophane pulp manufacture. Its principal constituent is lignin, a glue-like natural cement. From experience in a number of states which have used this fluid either as a dust layer, soil binder or for macadam mixes, it is estimated that it may save a large part of the cost of maintaining gravels and surfacing secondary roads.

Volcanic Ash

Nature has been kind to some parts of Alaska. Highways of volcanic ash, extremely stable and long wearing, can be found in certain localities there.

Wood pulp has been used for highway surfacing in Tasmania, the pulp being mixed with bitumen, to which is added 10 per cent tar or oil. Disintegration of the pulp in the hot mixture produces the binder material.

Soil conditions below sea-level make road building in the Netherlands a difficult job. One method has been the use of reeds impregnated with creosote oil and woven with wire into mats. Because they contain a high percentage of silicic acid, the reeds are resistant to rot, and are intended as a waterproof mat between the unstable mud and the layer of bricks on the surface.

Cotton

Cotton in highway construction was first introduced in South Carolina, and at present there are several states experimenting with this material. The general method of procedure consists of treating the gravel base of the road with tar or asphalt, on which is laid the cotton fabric. This is placed longitudinally in wide strips. A penetration asphalt is then applied to the cotton, which is of open weave to permit a bond between the prime and cover coats of asphalt. The fabric is also made of soft-twisted yarn in order that sufficient bitumen may be absorbed to preserve it in the ground. Stone is used to cover the cotton, and after a light rolling the road is opened to traffic. Conclusive evidence of the benefits from cotton highways has not yet been found.

A similar process has been followed in the surfacing of Calcutta streets, where jute cloth has been spread beneath the wearing-course so that moisture from the surface is unable to per-

colate, the base thereby being kept intact. The jute cloth also serves to bind the wearing-course to the substratum.

Quite original was the road built many years ago in Monterey, Calif., for it is probably still the only whalebone pavement in the world. And yet due credit for originality, and possibly a sense of humor as well, must be granted a particularly enterprising concern in Liverpool, England. Taking a cue, perhaps, from what was seen traveling over the highways, it conceived the idea of a tin can road, melting and molding the tin in the form of paving blocks. The average motorist, however, is apt to feel that whereas such things as tin cans and molasses may go perfectly well together, neither one sounds very promising for a highway.

Modern highway research is no longer the hit-or-miss affair of the individual road contractor that it once was in the days when the American motorists raised their cry of "Get us out of the mud!"

The Highway Research Board of the National Research Council in Washington maintains a whole technical and office staff to do nothing but collect, coordinate and serve as a clearing house for the distribution of information on highway research in all its phases from finance and gasoline taxes, to road construction and the highway aspects of the traffic safety problem.

Just across the Potomac River, near Arlington Cemetery in Virginia, the U. S. Bureau of Public Roads maintains its Experiment Station which undertakes original research in road construction.

There a test section of experimental road is laid out where all new advances in road construction and the fundamental engineering of highway building are put through the most exhaustive tests which science can devise.

Modern road building is no longer a question of drawing a route on a map after engineers and surveyors have been over the proposed site.

Modern "Divining Rod"

The 20th century equivalent of the ancient "divining rod"—the geophysical electrical prospecting method—is now employed to study subsurface structure of the land underlying a future highway. This technique is of the same type as that used to find salt domes in the oil fields of Texas. If plans require that the road go through a swamp, engineers determine how deep it is to bedrock so that they can carefully estimate the amount of rock fill needed to bear the highway surface.

Then too, electrical prospecting can

foretell the hidden location of gravel and rock deposits which might provide a cheap and easily accessible source of this valuable road material.

Another way that modern research aids highway building is in the use of thermocouples to determine the temperatures inside the concrete after it has been poured and is setting to its final rock-like nature. Moreover, thermocouples tell how much a large slab of concrete in a highway will expand or contract in the temperature range from torrid mid-summer to frigid winter in the various climes of the nation.

The special, full-sized concrete road at the Arlington Experiment Farm of the U. S. Bureau of Public Roads contains many of these thermocouples.

Some magnitude of the research program on this special test section of highway is obtained from the knowledge that 65,000 measurements of slab expansion and contraction and 30,000 temperature measurements have been taken, as well as 30,000 strain determinations and 25,000 deflection observations.

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From Page 375

between ships and shore, aircraft and ground and directional signals upon which human lives depend can be seriously interfered with by "sky waves" of considerable intensity set up by the short wave diathermy and artificial fever devices now employed by many physicians.

Dr. H. B. Williams of New York City warns physicians of the nation through the *Journal of the American Medical Association* (Nov. 28) that they must take prompt steps to abate this nuisance. Otherwise, he declares, relief through legislation will be sought, with a possibility of undesirable restrictions being placed on the use of therapeutic machines.

The council on physical therapy of the American Medical Association is expected shortly to alter its requirements for acceptance of electrical equipment such as is known to have caused interference. Manufacturers will be asked to submit evidence that the construction and installation specifications are such as to prevent interference.

Even when not a menace, the physician's and surgeon's diathermy machine may be a nuisance, causing static in every radio receiving set that derives

power from the same line, Dr. Williams points out.

The chief instance of radio interference from this cause came last winter when important activities of the Naval Research Laboratory at Washington,

D. C., were subjected to interference so serious as to stop the work completely.

After great trouble and expense, the disturbance was eventually traced to a diathermy unit located in a hospital at Cambridge, Mass.

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CHEMISTRY

Pre-Shrunk Paint Helps Prevent Surface Weathering

"PRE-SHRUNK" paint has become a reality. Contrived with the help of soybeans and tung nuts, this latest product of industrial research in new farm crops has had two results. It has altered previous knowledge of how paint should be made and further bears promise of solving the problem of weathering in this commodity.

"Pre-shrunk" paint is another of those curious unforeseen accidental discoveries which give constant zest to the life of the research chemist. This one happened in the laboratory of a South Bend manufacturing plant where tung oil's possibilities as a "vehicle" for paint were under investigation.

For use in paint tung oil requires a delicate high temperature treatment. The process, however, is often marked by failure because if the heat goes too high the liquid will change to a solid within a matter of seconds. For thirty years chemists have known how to control that trouble so the tung oil can be used in varnish. But, until recently use of tung oil in paint has been limited.

How the trouble was overcome and pre-shrunk paint evolved was revealed by M. F. Taggart, director of research for the South Bend concern.

"After trying all practical mixtures of oil," Mr. Taggart stated, "we found that a mixture of 45 per cent soybean oil with 55 per cent tung oil was the best combination to prevent solidification in the high temperature treatment required to make the tung oil usable in paint.

"In one particular trial we started with 775 pounds of the oil mixture which is equivalent to 100 gallons. This was raised to the suitable temperature with no difficulty, but in measuring up we discovered that although our mixture still weighed 775 pounds we only had 97 gallons of the liquid. Somehow there had been a shrinkage of three gallons, this being indicated by an increase in

specific gravity exactly equivalent to the seemingly missing portion.

"Inasmuch as raw oils shrink during weathering, this pre-shrinking of the soybean-tung oil combination contributes to a longer life of the paint."

This accidental discovery, Mr. Taggart continued, immediately caused the scrapping of all previous knowledge of how paint should be made. Another problem arose, however, involving the question of what type of pigments and in what proportion of those pigments the new oil combination would work best.

Using the new "vehicle" with its peculiar "pre-shrunk" property, the chemists then went to work on hundreds of paint formulae. One pigment at a time was at first used, then pairs of pigments, and so on through the gamut of available pigments until eventually the one formula was determined in which the "pre-shrunk" quality of the oil can be utilized to the best advantage.

Science News Letter, December 12, 1936

ARCHAEOLOGY

Pipe Played in Stone Age Found in Oldest City

WHAT is believed to be the oldest musical instrument known to man has been discovered at ancient Tepe Gawra, Mesopotamia, it was stated by Prof. Millar Burrows, Yale Divinity School, President of the American Schools of Oriental Research.

The instrument, part of a double pipe of bone, dates from the Chalcolithic Age, when man was shifting from the Stone Age to the Age of Bronze. Tepe Gawra, famed as the world's oldest known city, is being excavated by a joint expedition of the University of Pennsylvania Museum and the American Schools of Oriental Research, under direction of Prof. E. A. Speiser of the University of Pennsylvania.



PIPE FROM OLDEST CITY

Another discovery from the Chalcolithic Age, of great importance to art history, is a large bowl decorated with red paint in panels showing sections of landscape, including mountains, rivers, animals and even a hunting scene.

From a higher level of the mound at Tepe Gawra, about 3000 B. C., comes a carnelian bead of a kind characteristic of the ancient Indus Valley culture, one of the many illustrations of the commercial contacts between India and Mesopotamia in the Early Dynastic Period.

To determine the date of a remarkable Round House discovered toward the end of the last season's campaign, the expedition is carrying the whole excavation down to a level previously reached in a small segment of the mound. When this has been done the lower levels will be investigated in order to establish the sequence of the ruins and of the prehistoric painted pottery, Prof. Burrows said.

The bone musical pipe played at Tepe

Gawra some 6,000 years ago is very old, but it has a strong rival for the title of "world's oldest musical instrument."

The rival is a pipe made of a lion's tooth, found in the mountains of Czechoslovakia in 1934, and considered to

have been made and played by cave men of Europe 30,000 years ago. The lion-tooth pipe still signals its two notes—D and G—so Prof. Karel Absolon of Brno University reported, when he tried out the sound.

Science News Letter, December 12, 1936

MEDICINE

New Yellow Fever Vaccine Promises Better Protection

AN IMPORTANT improvement in vaccination against yellow fever is imminent, it appears from the report of Dr. Wilbur A. Sawyer of the International Health Division of the Rockefeller Foundation, to the American Society of Tropical Medicine.

A new vaccine against the dreaded yellow jack is expected as a result of isolation of a new, safer strain of yellow fever virus. The vaccine which Dr. Sawyer and associates developed some years ago, and which can only be made in limited amounts, had to be used with serum from blood of individuals immune to the disease as a result of recovery from a previous attack. The new virus, it is confidently expected, can be safely used for vaccination without this protective immune serum.

Vaccination is not yet in the stage where it can be used for entire populations. Protection of a whole country or continent from the disease is being sought by other methods. Recent developments in Brazil, Dr. Sawyer pointed out, have taught scientists that they must learn new methods for the control of this dangerous disease.

Following the discovery by Walter Reed and his associates, that the disease is spread by a particular kind of mosquito, and the demonstration by Gorgas in the Panama Canal Zone that anti-mosquito measures could check the disease, scientists thought they could wipe

it completely from the face of the earth. Campaigns in one country after another were undertaken, with apparent success. The method was to eliminate mosquito breeding in key locations, the cities and towns and other centers of population. Just as scientists thought they were nearing victory, investigators for the Rockefeller Foundation discovered that the goal was nowhere near in sight. The reason is that a form of yellow fever has been discovered in forest regions of South America. Anti-mosquito measures effective in cities will not work in these forest and jungle regions and new methods will have to be found. A further complication is the discovery that yellow fever can be carried by more than one type of mosquito. The newly-discovered yellow fever mosquitoes have different breeding habits and will require new and different methods of control.

Science News Letter, December 12, 1936

By removing the protein in rubber before processing it, chemists find that they can produce rubber that has lower water absorption and better electrical properties than ordinary rubber.

RADIO

December 15, 5:15 p.m., E.S.T.
CHANGING THE CLOSED MIND—Dr. Irving Lorge, Psychologist, Columbia University.

December 22, 5:15 p.m., E.S.T.
TOYS OLD AND NEW—Watson Davis, Director of Science Service, Washington, D. C.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

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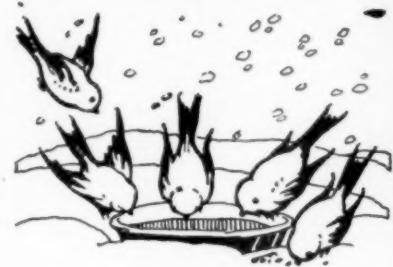
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A Cup of Warm Water

HE WHOSE BIRTH we celebrate on Christmas Day once assured us that he would remember even a cup of cold water given to the least of his creatures. That he loved birds is evidenced by his frequent references to them during the recorded years of his life. Charity to the birds would seem, therefore, a most fitting Christmas benevolence.

We often think to give birds food in winter. It involves no more than scattering table crumbs on the snow; though if our benevolent instincts be more fully developed we may build feeding trays more or less elaborate. But water is no less necessary to birds than food, and they are often harder pressed for something to slake their thirst than they are for something to eat. This is especially so in severe weather, when the chance pools that usually afford them a supply are frozen solid. It is then that a pan of water set out in a sheltered spot (but one clear of cat-danger!) will be most welcome to the birds.

And do not set out merely a pan of cold water, if the weather be freezing. It will immediately seal itself with ice, perhaps before all the bird clients that visit your yard shall have had a chance to drink. Let it be warmed up—make it as hot as you like your own tea or coffee. Then it will be a long time freezing, for water has an astonishing capacity for heat and loses it more slowly than any other common substance. Birds do not have the same prejudice American humans have in favor of ice water, especially in winter. They are glad to get something warm to drink. There is no charity bought so cheap that can make so many living creatures happy, as a cup of warm water.

Science News Letter, December 12, 1936

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WATSON DAVIS, Director.

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Seismology

INTRODUCTION TO THEORETICAL SEISMOLOGY, PART I: GEODYNAMICS—J. B. Macelwane and F. W. Sohon—*Wiley*, 366 p., \$6. This book's appeal will be to a quite limited audience, seismologists and other students of geophysics; but it will be very valuable to them, and has been waited for with some impatience for a long time. The authors are prominent in the activities of the Jesuit Seismological Association, with which organization Science Service has for some years cooperated in the locating and prompt reporting of earthquake epicenters.

Science News Letter, December 12, 1936

Geology

THE SELECTION, ORGANIZATION, AND EVALUATION OF LOCALITIES AVAILABLE FOR UNSPECIALIZED FIELD WORK IN EARTH SCIENCE IN THE NEW YORK CITY REGION—Herbert J. Arnold—*Teachers College, Columbia University*, 229 p., \$2. Teaching geologists in the New York region should find this field guide exceedingly useful.

Science News Letter, December 12, 1936

Rubber—Bibliography

1935 BIBLIOGRAPHY OF RUBBER LITERATURE (EXCLUDING PATENTS)—Donald E. Cable, comp.—*Rubber Age*, 130 p., \$1.

Science News Letter, December 12, 1936

Physiological Chemistry

PHYSIOLOGICAL CHEMISTRY (6th ed. rev. and enl.)—J. F. McLendon and the late C. J. V. Pettibone—*C. V. Mosby*, 454 p., \$3.50.

Science News Letter, December 12, 1936

Zoology

AFRICAN REPTILES AND AMPHIBIANS IN FIELD MUSEUM OF NATURAL HISTORY—Arthur Loveridge—*Field Museum*, 111 p., 75c.

Science News Letter, December 12, 1936

Ornithology

CATALOGUE OF BIRDS OF THE AMERICAS AND THE ADJACENT ISLANDS IN FIELD MUSEUM OF NATURAL HISTORY, PT. IX—Charles E. Hellmayr—*Field Museum*, 458 p., \$4.

Science News Letter, December 12, 1936

Philately

COLLECTING STAMPS FOR FUN AND PROFIT—A. Frederick Collins—*Appleton-Century*, 200 p., \$2. If you have a young person in your family (any age

from nine to ninety) who is getting nicely warmed up in the genial mania known as philately, you can secure his undying affection by giving him this book for Christmas. It goes far beyond mere information about stamps and where they come from, into the arcana of papers, watermarks, perforations, engraving and printing, counterfeits, and gives practical suggestions on how to build up a really scientific collection with maximum efficiency and best returns for expenditures.

Science News Letter, December 12, 1936

Botany

A MONOGRAPH ON THE GENUS HEUCHERA — Carl Otto Rosendahl, Frederic K. Butters and Olga Lakela—*University of Minnesota*, 180 p., \$3.

Science News Letter, December 12, 1936

Cryptology

SECRET WRITING, AN INTRODUCTION TO CRYPTOGRAMS, CIPHERS AND CODES—Henry Lysing—*Kemp*, 118 p., \$1. If you are interested in secret writing from a literary angle only (from Poe's "Gold Bug" to next month's pulp detective thriller), or as an adjunct to wars now waging or yet to come, or simply as an exercise in mental ingenuity, you will find meat for many fascinated hours packed between the covers of this small book.

Science News Letter, December 12, 1936

Zoology

MONKEYS—Rose Fyleman—*Nelson*, 107 p., illus., \$1. A chatty, discursive, interesting but informative book about our "hand-footed" cousins of the tree-tops, their distribution, classification, habits both in the wild and in captivity, plus many a fascinating but avowedly apocryphal traveller's tale.

Science News Letter, December 12, 1936

Psychiatry

BE GLAD YOU'RE NEUROTIC—Louis E. Bisch—*Whittlesey House*, 201 p., \$2. Intended to cheer the layman who is, or who thinks he is, somewhat abnormal emotionally. The author attributes his interest in psychiatry to the fact that he is himself neurotic.

Science News Letter, December 12, 1936

Zoology

THE BOOK OF LIVING REPTILES—Raymond L. Ditmars; Illus. by Helene Carter—*Lippincott*, 64 p., colored illus., \$2. Maps of countries and continents with pictures of the reptiles spotted in where they belong, with chapters of running text that present essential facts in attractive readable fashion. Would make a most acceptable Christmas present for anyone interested in this aspect of natural history.

Science News Letter, December 12, 1936

Seismology

UNITED STATES EARTHQUAKES, 1934—Frank Neumann—*Gov't. Print. Off.*, 101 p., illus., 15c. The more important earthquakes of 1934 listed and analytically discussed. This bulletin will be of interest and value not only to seismologists but to architects and engineers working in seismic regions.

Science News Letter, December 12, 1936

Industrial Photography

THE COTTON BOOK, A PHOTOGRAPHIC PICTURE-BOOK WITH A STORY—William Clayton Pryor and Helen Sloman Pryor—*Harcourt, Brace*, 101 p., \$1. An interesting photographic sequence tells the story of cotton from the boll to fabrics.

Science News Letter, December 12, 1936

Ichthyology

AQUARIUMS AND FISH PONDS—A. Laurence Wells—*Warne*, 64 p., 60c. A compact illustrated book on an increasingly popular hobby, by an English author.

Science News Letter, December 12, 1936

Ornithology

MORE SONGS OF WILD BIRDS—Albert R. Brand—*Nelson*, 116 p., 3 records, \$2.50. Companion volume to a successful earlier book. In addition to the novel group of sound records, the text includes "Confessions of a Sound Recorder," "Significance of Bird Songs," and condensed descriptions of the birds whose songs are here made available for phonographic reproduction.

Science News Letter, December 12, 1936

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